

Scientific Writing Course
October 31- November 4, 2022

Figures

Elly Munde

Tuesday 1 November 2022



University of California
San Francisco

advancing health worldwide™

Figures

Why use figures?

“One picture is worth a thousand words”

- But use caution and common sense
 - Figures are time consuming
 - Good at conveying overall effects but poor at conveying specific measurements
 - If details matter, use a table instead or put the exact values in the text --- figures can only show a few results
 - A poor figure is worse than no figure at all

Common Types of Figures

- Photographs
- Diagrams
- Data presentations
- Maps

Photographs

- Appropriate photographs might be gels, micrographs, pictures of patients, etc.
- Never assume the reader will recognize anything in a photograph.
- Label everything that is relevant, using arrows, asterisks and common abbreviations.
- Unless the scale of the photograph is obvious, include a ruler or indicate the magnification or reduction in the figure's legend.

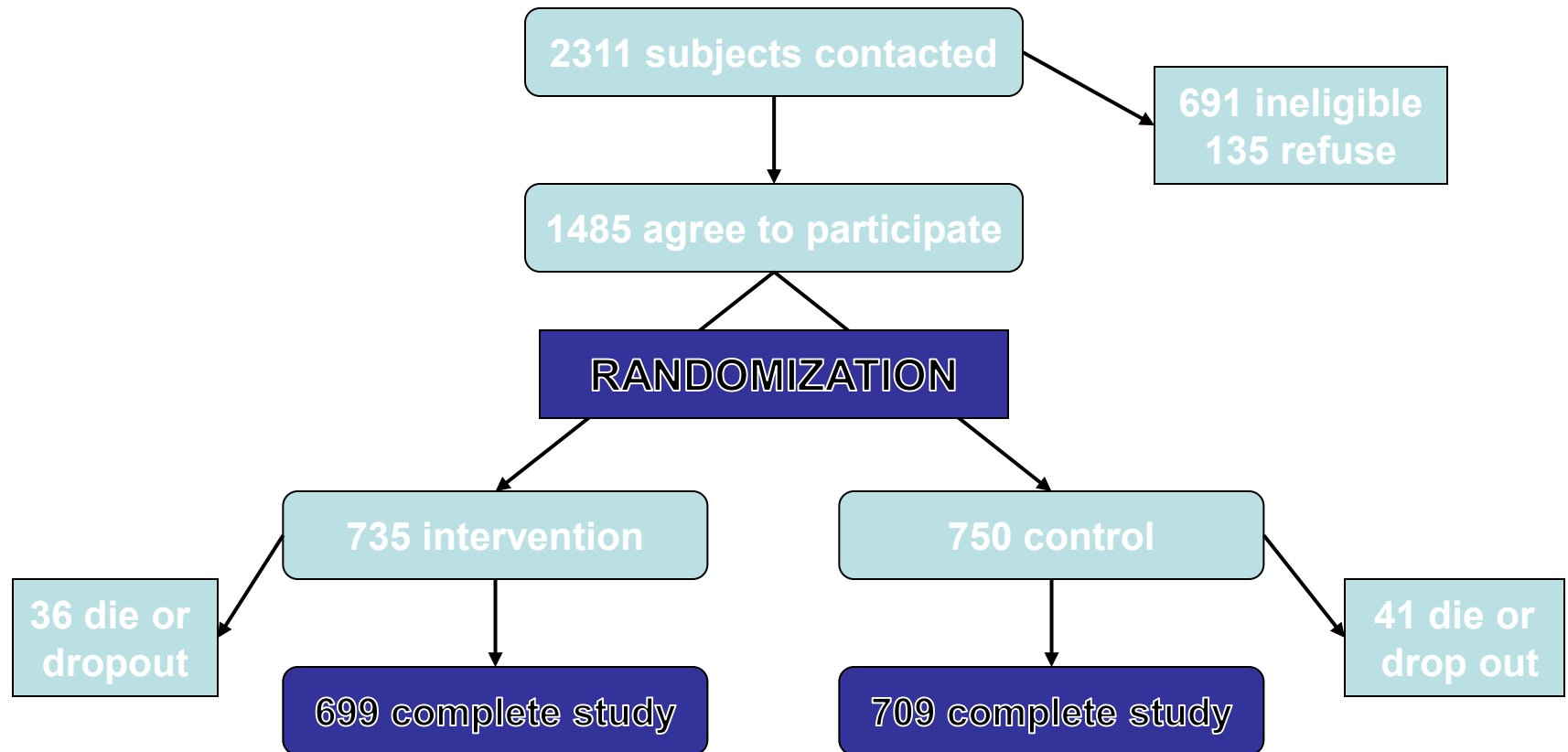
Photographs

- Photographs are relatively expensive to publish and hard to include in an electronic version of the paper.
- Make sure the photograph is really needed and adds to the paper.
- To check clarity of the photograph, photocopy it –assume it will be copied over and over as your paper is passed around.

Diagrams as figures

- Appropriate diagrams might include the flow of subjects in a study, complicated sampling schemes, or a genetic pedigree.
- But keep it simple, err on the side of simplicity rather than thoroughness
- Use smaller fonts for the less important items or details, but font must be legible!
- Consider getting professional help -- good desktop publishing skills can make a diagram look professional and clear.

As a general rule, sampling schemes are displayed vertically...



...and, measurement algorithms are displayed on a horizontal time axis

**Initial interview;
Consent obtained**

Repeat EKG

Exercise test

Repeat EKG

**Enrollment
2016-17**

**First visit
March-June, 2018**

**Second visit
October, 2019**

**Study end
December 31, 2020**



Figures that present numerical data

- These types of figures are the hardest. They can be very effective if done well, but need to ask if really needed.
- Use if overall pattern is more important than actual values (1 picture worth 1000 words).
- Figures should have a minimum of four data points. Anything less can be placed in the text.

Figures that present numerical data

Some Useful Types

Figures connecting data points measured on several occasions in the same subject

Multiple measurements on multiple occasions would be hard to demonstrate in a table or in the text.

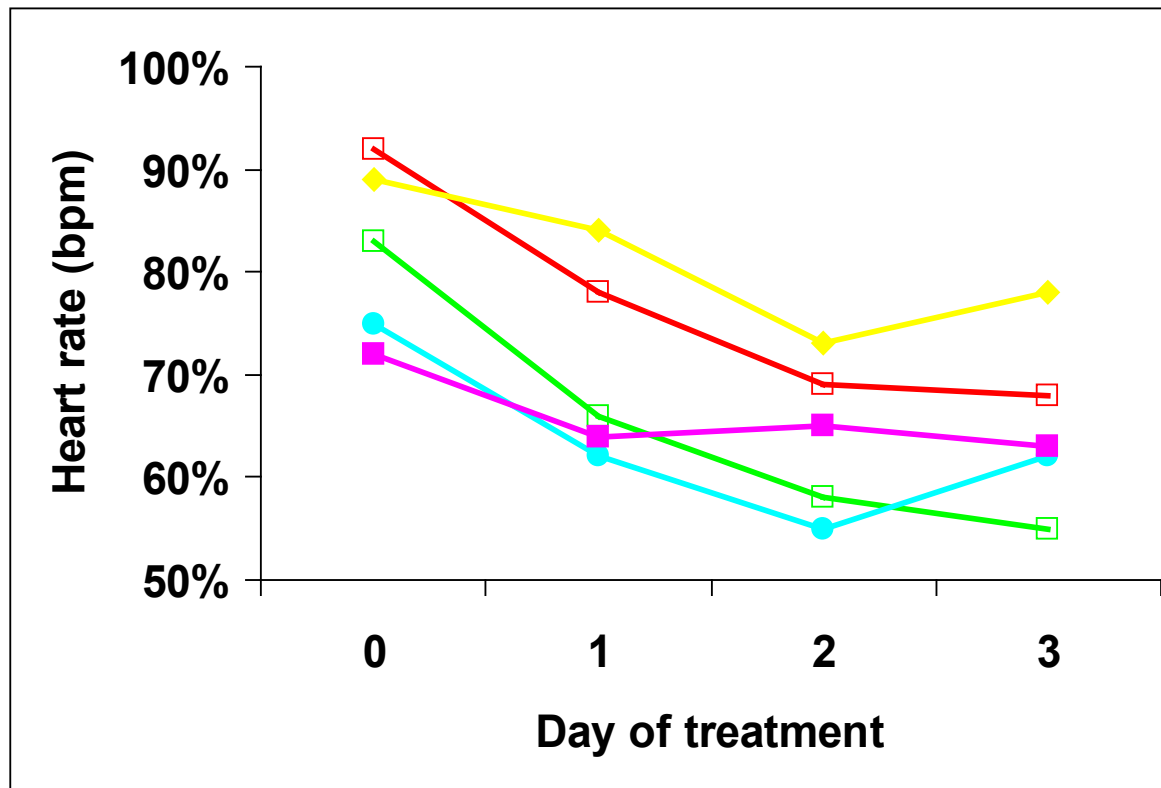
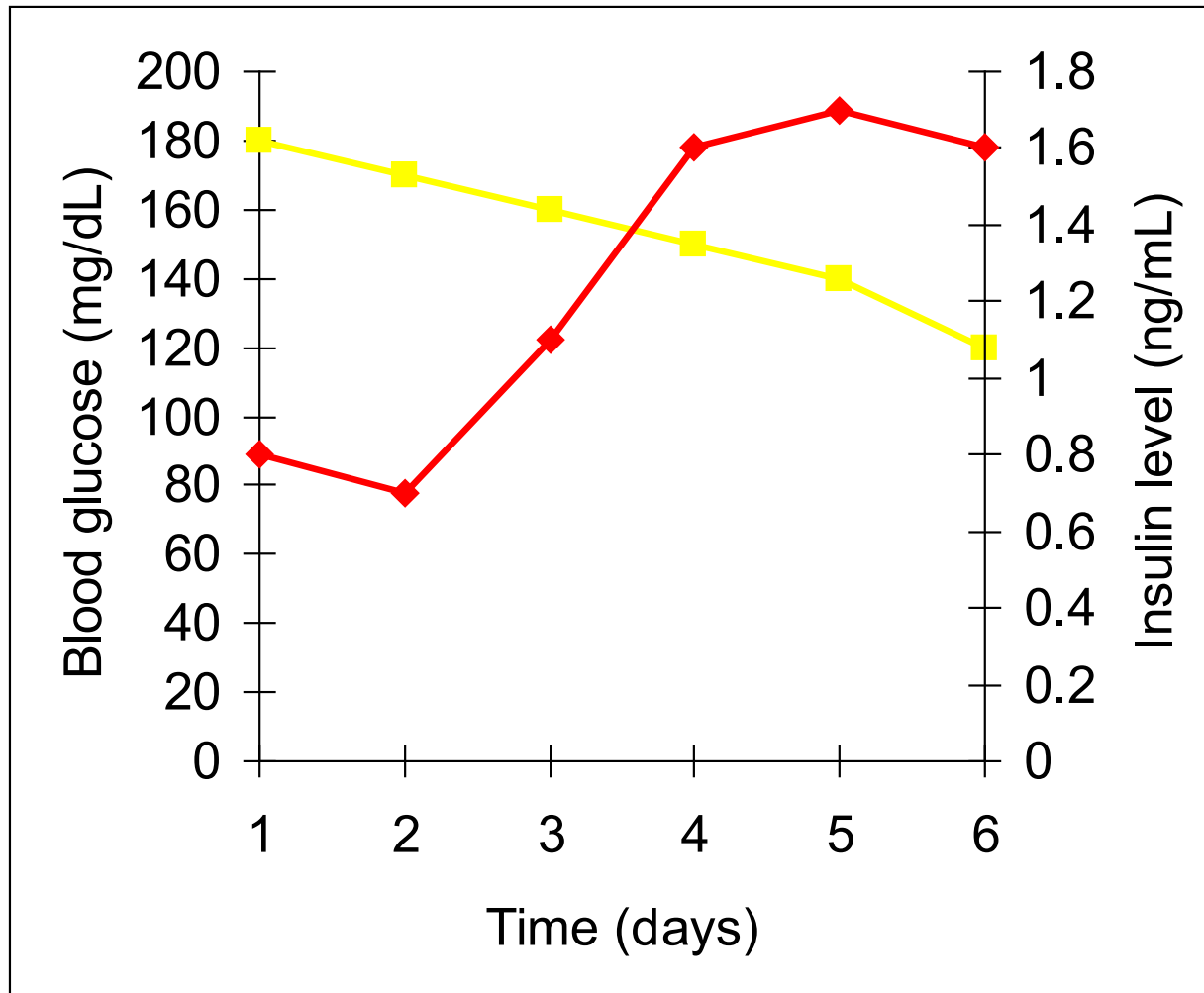


Figure 7.3 Heart rate in beats per minute by day of treatment in 5 patients

Always check figures for potential misunderstandings – Beware of lines that cross

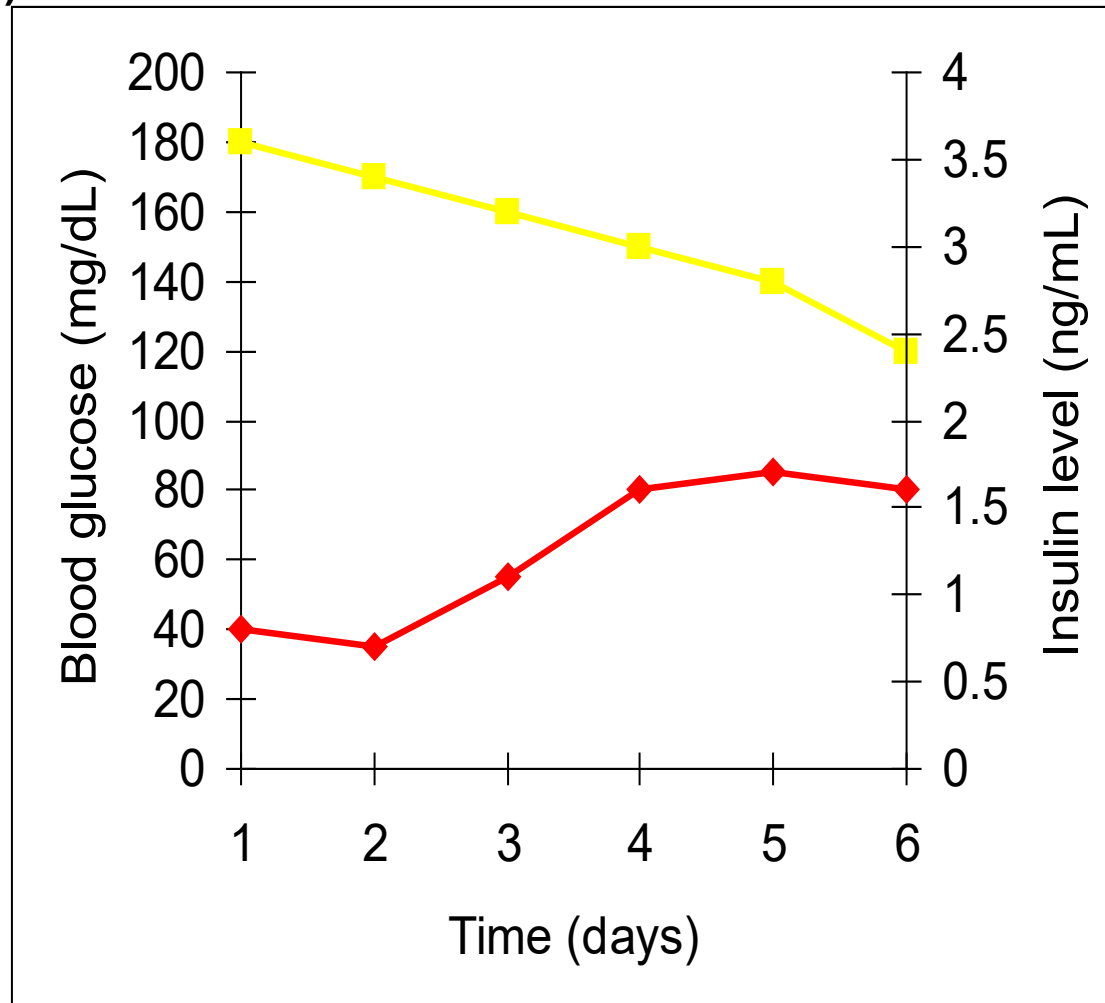
Figure 7.5 Blood glucose (diamonds) and serum insulin levels (squares) versus time.



Note: eye is drawn to crossover at day 3 & 4 even though just a coincidence

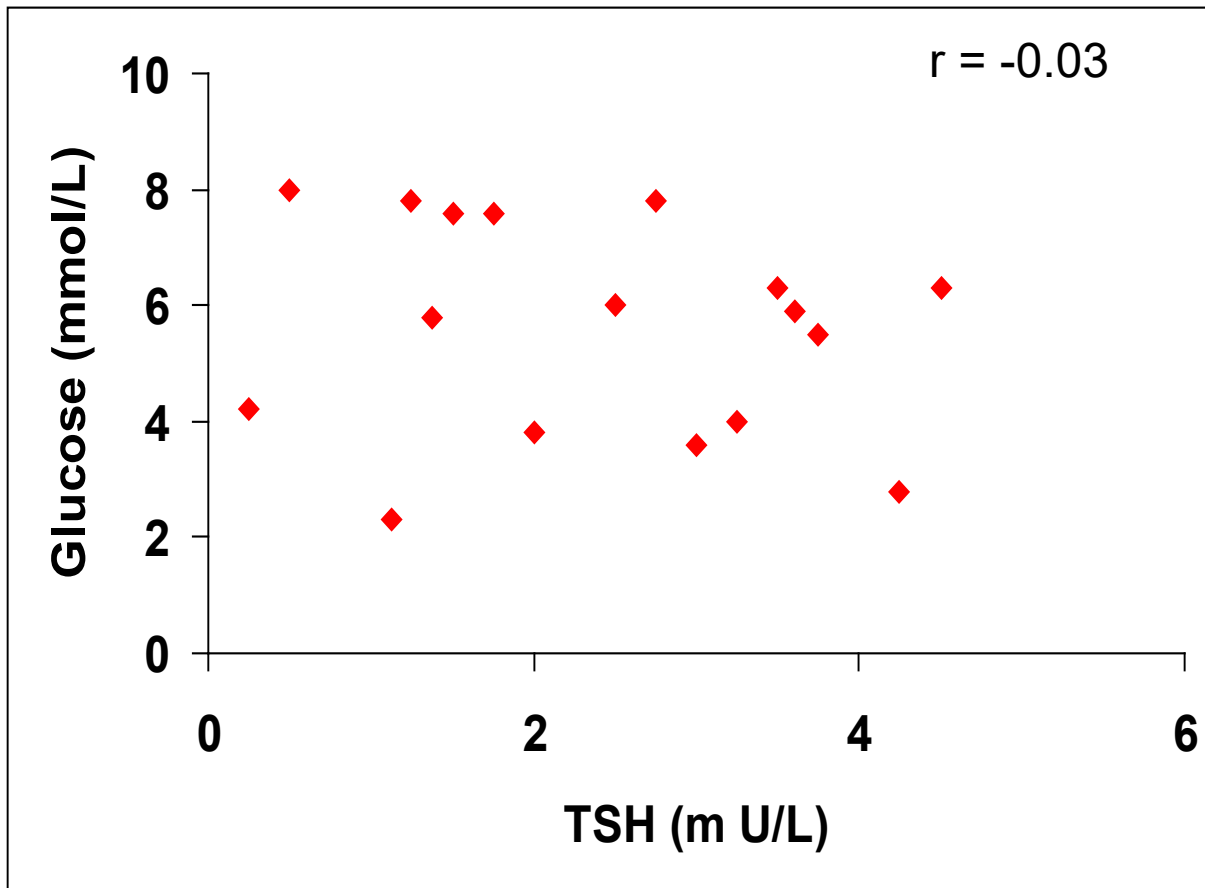
Consider redrawing with different scale to avoid problem of crossing lines

Figure 7.6 Blood glucose (diamonds) and serum insulin levels (squares) versus time.



Figures can be used to illustrate a lack of association

Figure 7.10 Lack of association between thyroid-stimulating hormone (TSH) and glucose levels in patients at weight-loss clinic



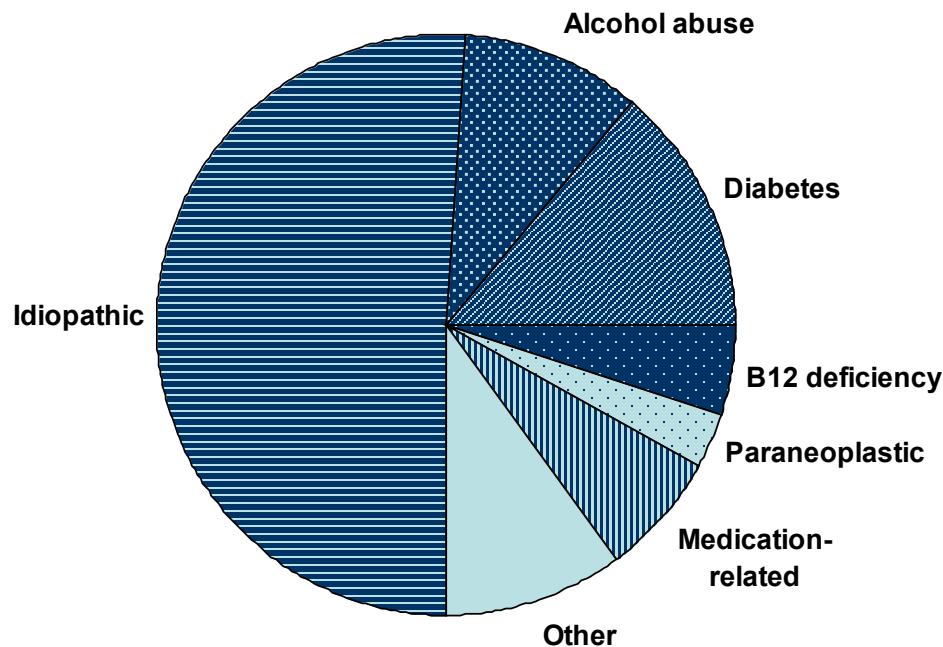
Bars jumping up & down, a tangle of lines or scattered dots can be effective, but be sure to label your intent (“lack of association” is used here to do that).

Types of Numerical Figures

- Pie charts
- Scatter plots
- Bar graphs
- Line graphs

Pie Charts

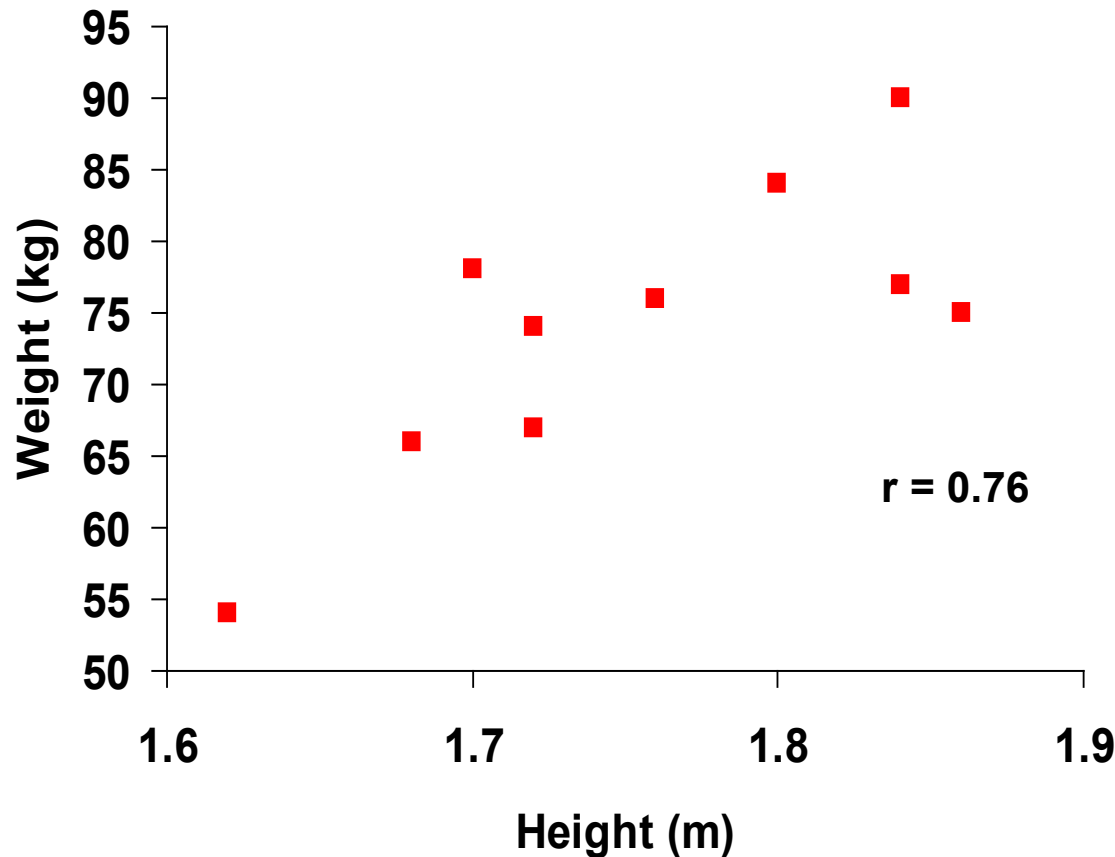
Figure 7.11 Causes of neuropathy in primary care patients



- Avoid using in written manuscripts
- They don't look good
- Data usually better presented in another format
- Use text if only a few slices or table if more

Scatter Plots

Figure 7.12 Correlation between height and weight in 10 subjects

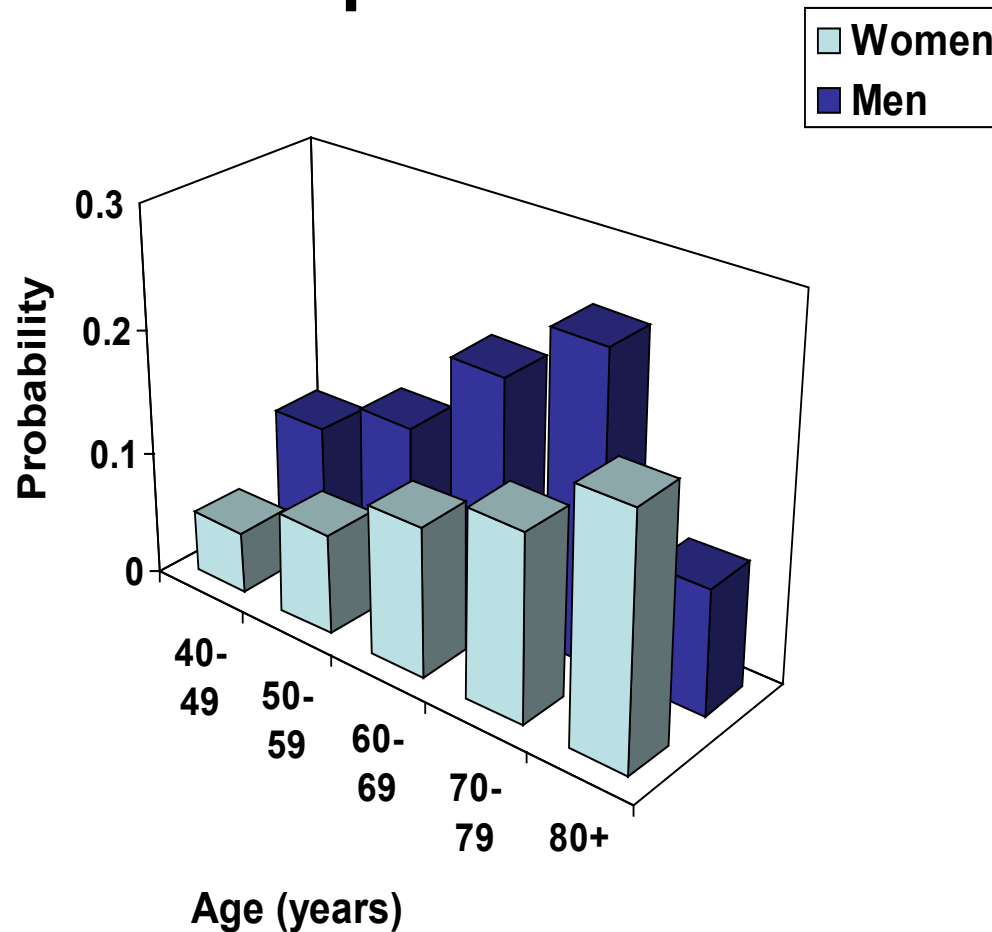


- Scatter plots can easily show the correlation or lack of correlation between 2 variables
- Showing the regression coefficient is helpful too

Bar graphs

- Valuable for displaying results by categories of subjects, e.g. men & women or before & after
- Most useful when the value of the outcome variable is most important (rather than the confidence interval)
- Pick which way to display the pattern of the data – usually values are compared side by side

Bar Graphs



3 dimensions:

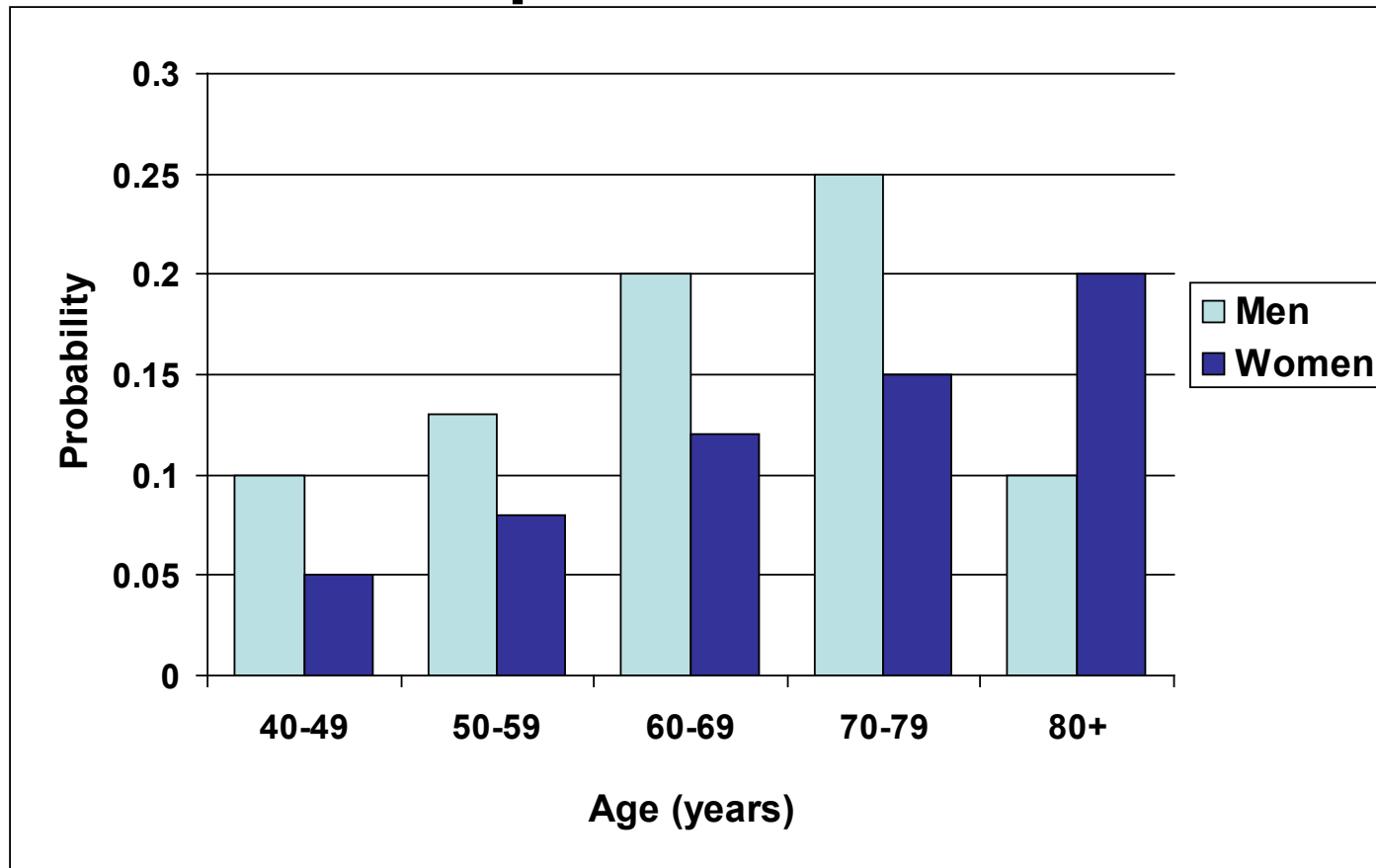
Age, gender & probability ----

However, looks clustered and unnecessarily complicated

Reserve for when you have 3-dimensional data

Figure 7.13 Likelihood of admission to an intensive care unit by age and gender

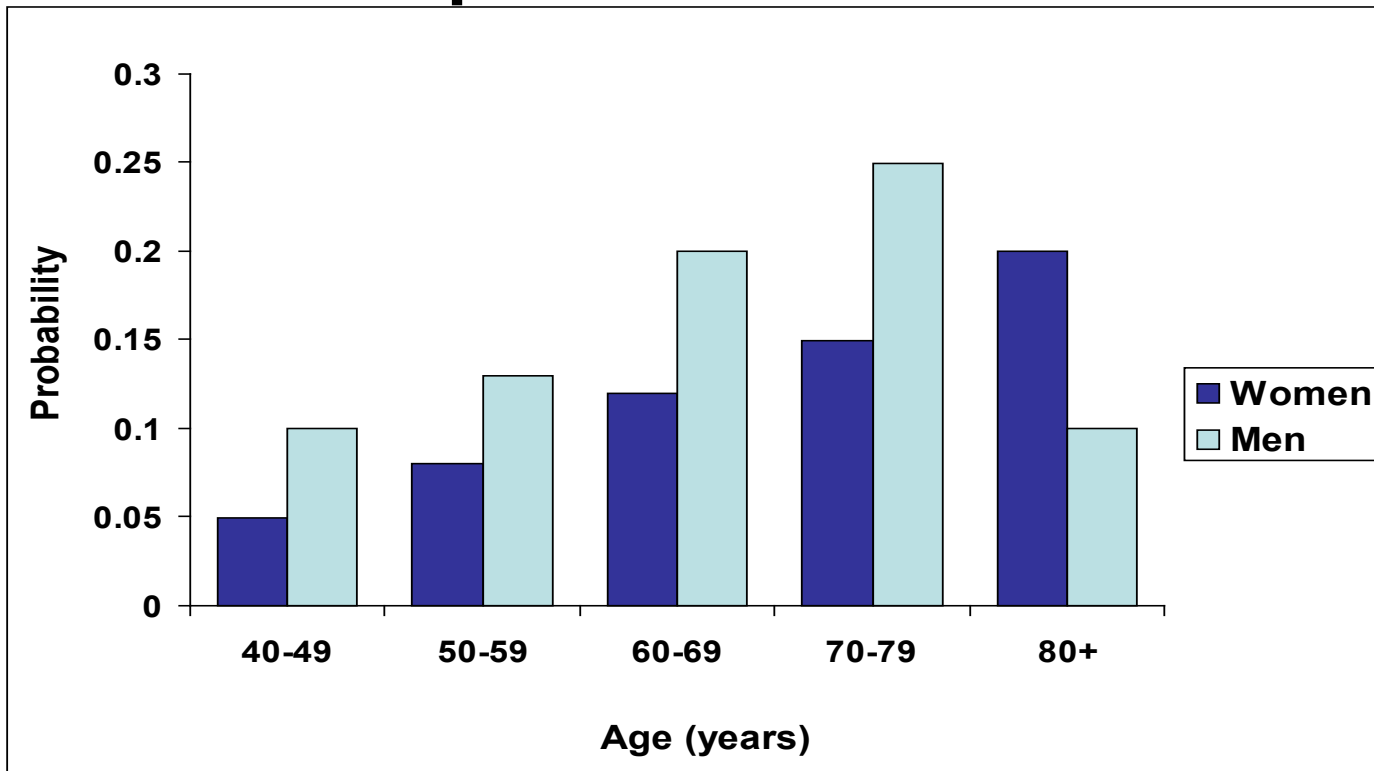
Bar Graphs cont.



Same results
are more
easily
displayed
with
2 dimensions

Figure 7.14 Likelihood of admission to an intensive care unit by age and gender

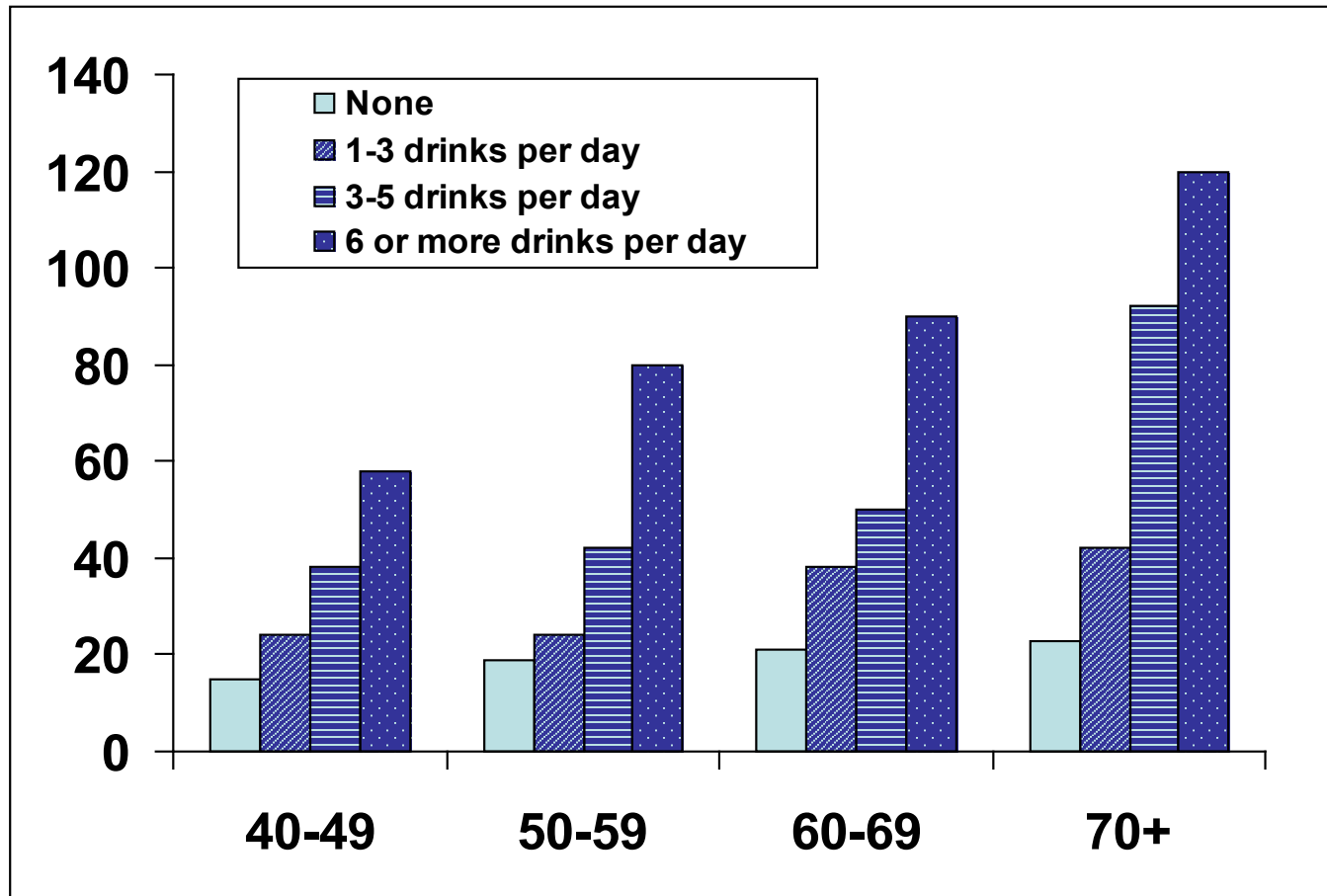
Bar Graphs cont.



Rearranged
so that the
taller bar
stands to the
right (in most
cases,
anyway)

Figure 7.15 Likelihood of admission to an intensive care unit by age and gender

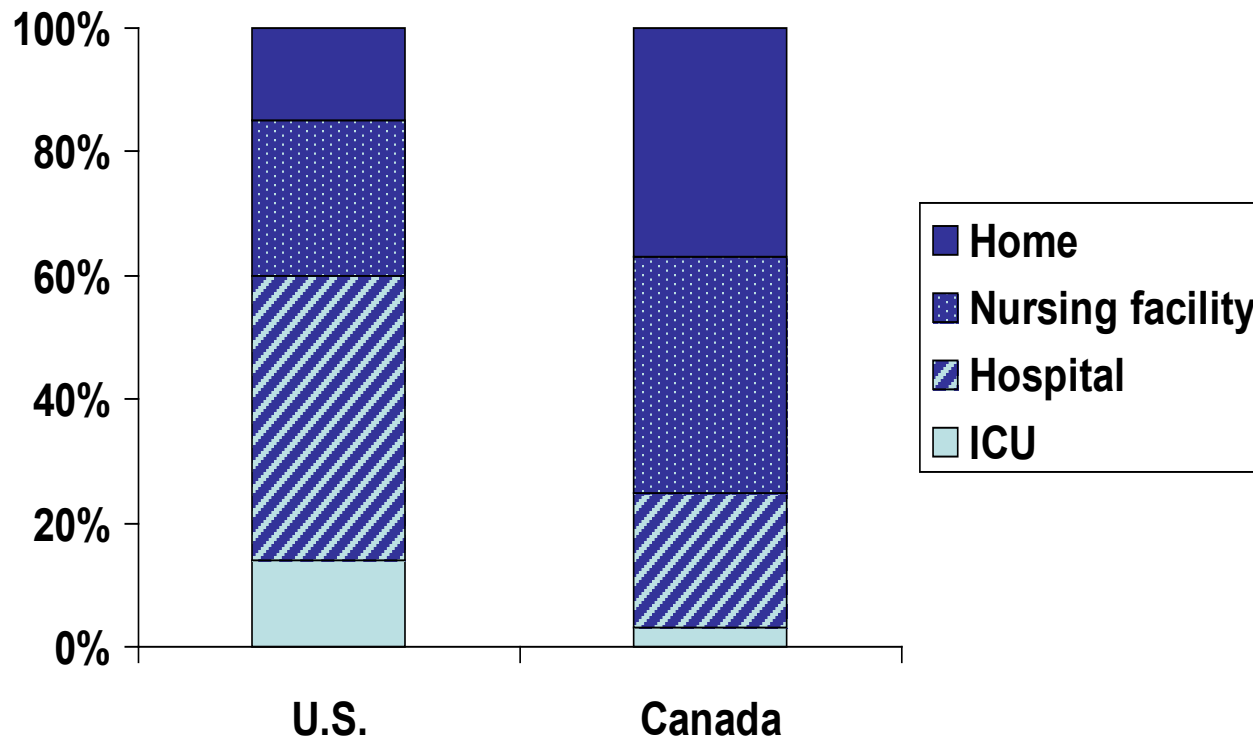
Crosshatches or lined bars to distinguish categories



Not needed
when pattern is
clear, designs
just make graph
look busy

Figure 7.18 Annual risk of hepatoma by age & alcohol consumption

Crosshatches or lined bars to distinguish categories



When the pattern is not clear, using designs to distinguish sections of the bars can be helpful. Keep the types of sections to no more than four or five.

Figure 7.22 Site of death among persons 65 years of age or older in the U.S and in Canada, 1988

Grouped Bar Graphs

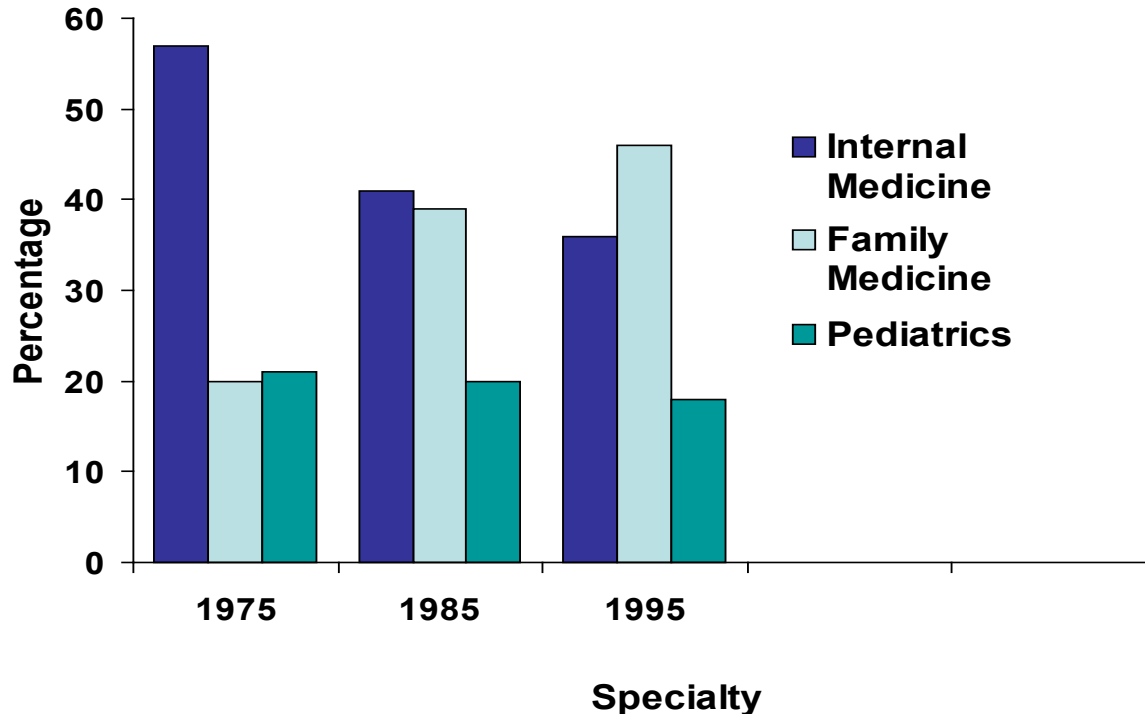
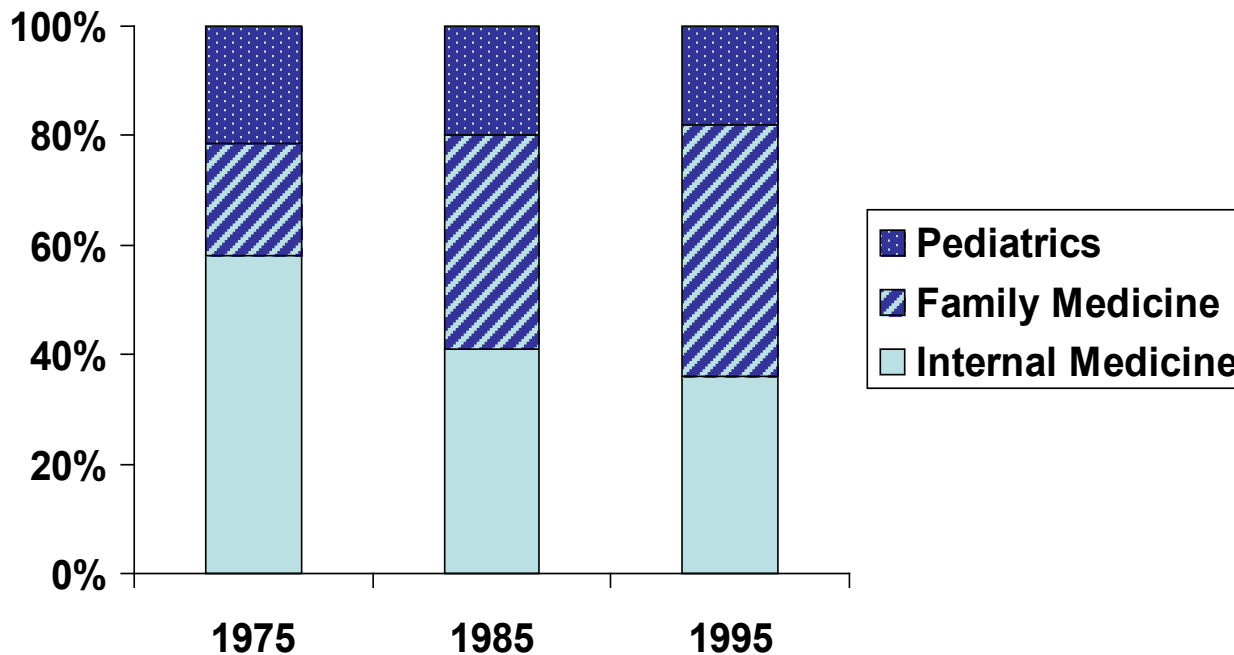


Figure 7.20 Proportions of students in 1975, 1985, and 1995 choosing various primary care specialties

Grouped bar graphs work well when the category totals add to the same quantity (e.g. 100%); Each year the sum of specialty choices = 100%

Stacked Bar Graphs



A stacked bar graph makes the point better than the previous bar graph because the sum for each year adds to 100%.

Figure 7.21 Proportions of students in 1975, 1985, and 1995 choosing various primary care specialties

Line Graphs

Avoid overcrowding. Hard to see which group is which. Main point may be lost. 4 groups of connected points are plenty (for more, use subfigures)

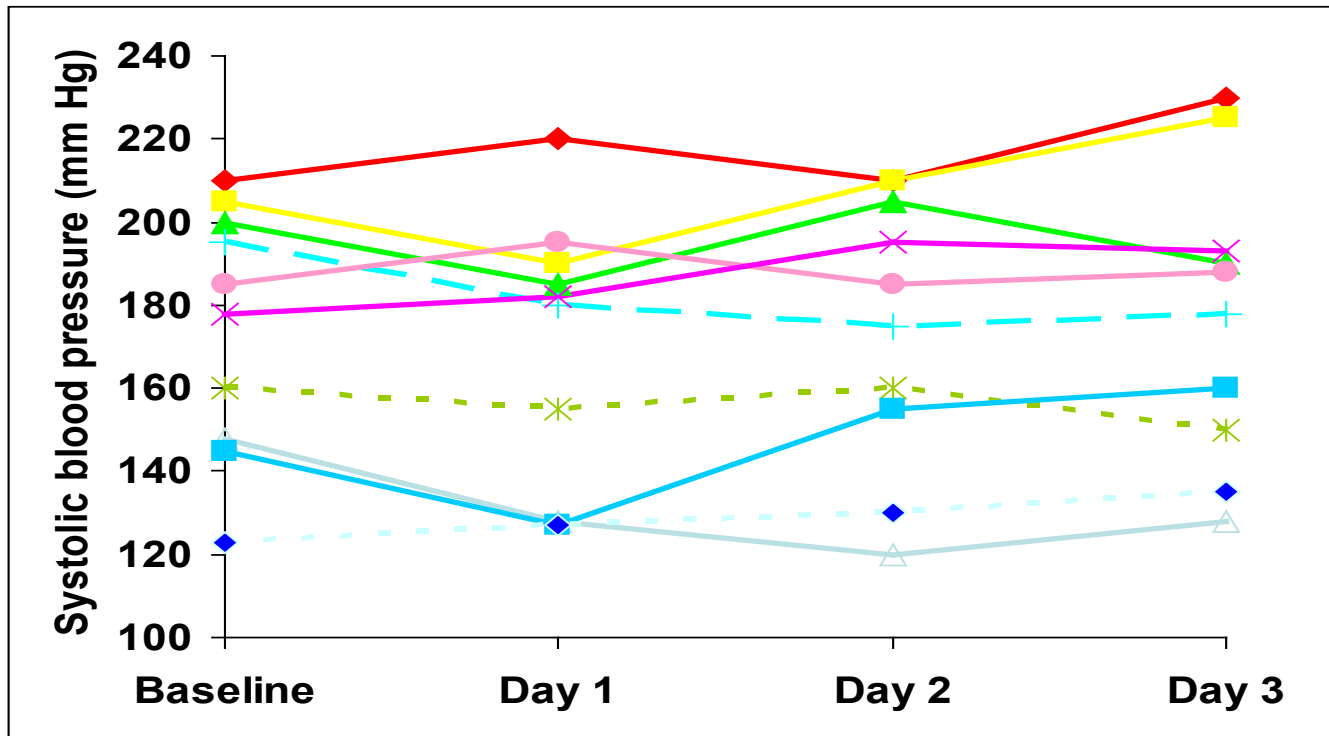
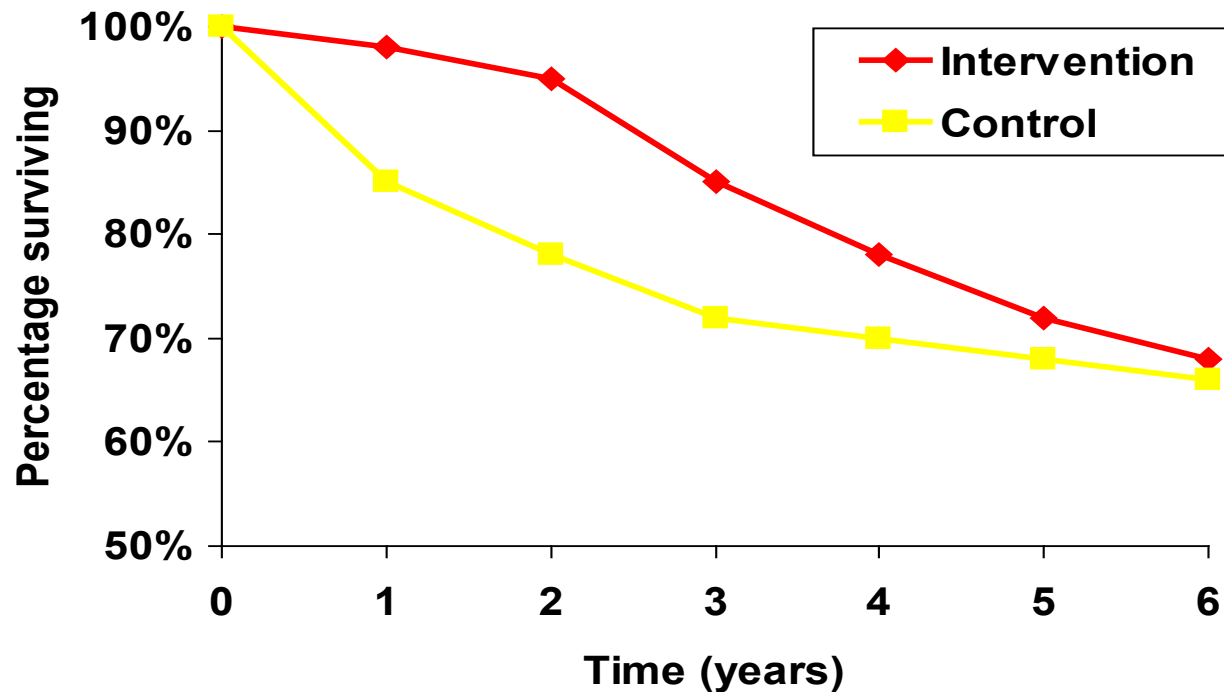


Figure 7.23 Blood pressure in 10 subjects treated with ineffectivipine

Survival Curves



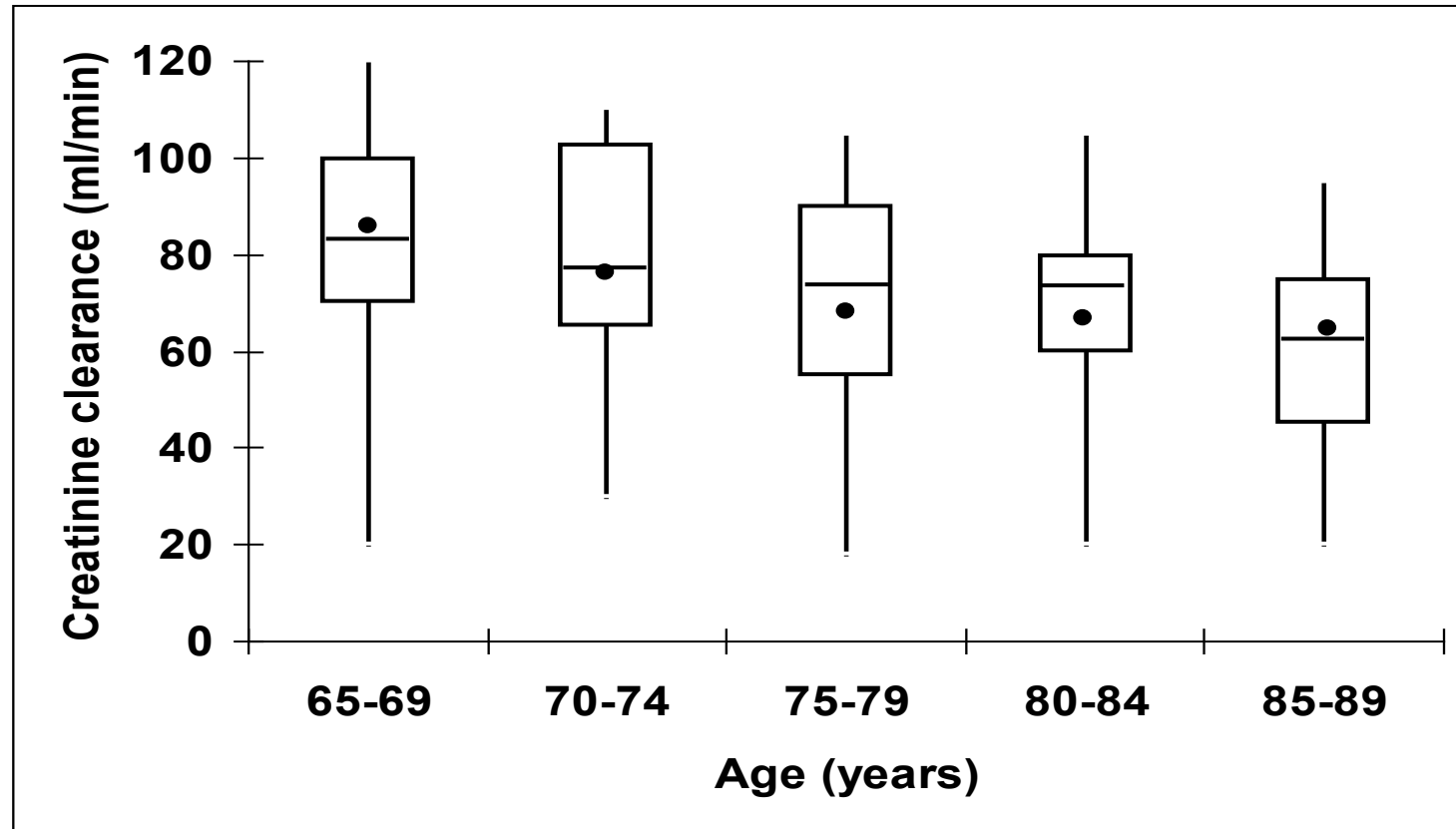
Survival curves show proportion surviving at various time points, also known as Kaplan-Meier Curves.

Intervention	152	123	110	86	51	24	12
Control	148	110	98	72	63	29	10

Figure 7.26 Cancer recurrence-free survival comparing the intervention and control groups during 6-year follow-up. The denominators for each group are indicated.

Box and Whisker Plots

Figure 7.27 Mean (filled circle), median (horizontal line), 25th and 75th percentiles (box), and range (whiskers) of creatinine clearance by age of the subjects.



Useful for describing the distribution of the data.
Shows the range, mean, median, 25th & 75th percentiles.

Maps

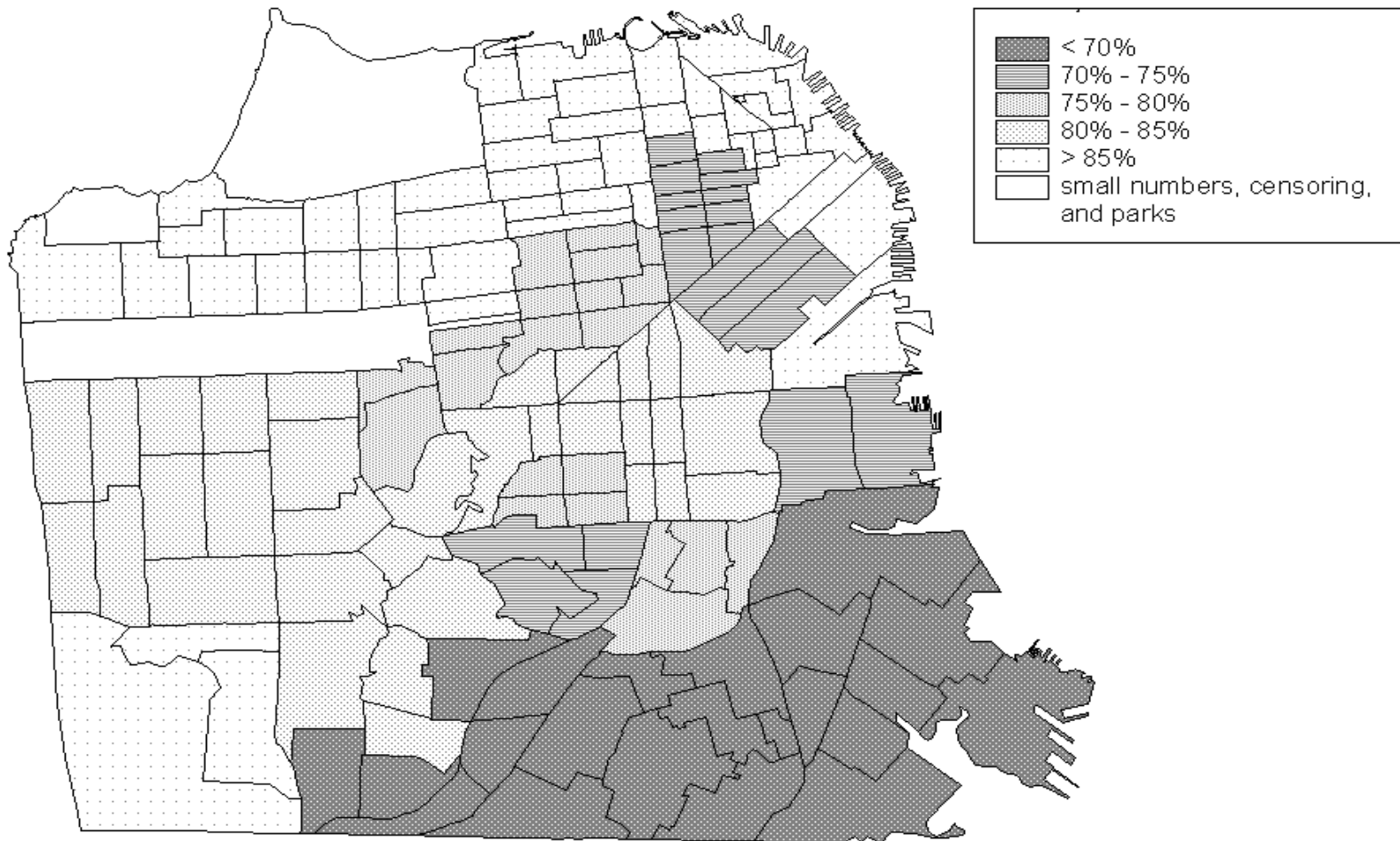


Figure 2. Five year survival among persons with AIDS by neighborhood, San Francisco, California, 1996 - 2001.

Figure legends

- ✓ All figures should have legends.
- ✓ Remember, figures in your article may be reproduced and used as a slide or handout by others.
- ✓ The legend shouldn't give away the results. The text should complement and expand on the information given in the legend.
- ✓ Avoid ambiguous abbreviations like "Group 1"; readers should understand the point of the figure at a glance.

Figure legends

- ✓ Use a brief phrase to describe the figure.
- ✓ Minimize experimental detail.
- ✓ Describe all panels in a multi-panel figure.
- ✓ Point out unusual features.
- ✓ Don't repeat anything in the legend that is shown on the figure, such as units, but be sure to explain all abbreviations not used in the text, as well as all lines, bars, and symbols.

Figure legends

- ✓ Indicate whether symbols represent mean or individual values, or if error bars represent the SEM, SD, or confidence interval. That information and the statistical tests you used to analyze the data should be included in the legend.
- ✓ Cite the original source of previously published figures, even those from your own published papers

Features of a good Figure Legend

- 1. Title:** A brief title that applies to the entire figure, including all panels
- 2. Materials and methods:** A description of the techniques used
- 3. Results:** A statement of the results that can be gleaned from the particular figure
- 4. Definitions:** An explanation of features in the figure

Checklist for figures

1. Does every figure make its point clearly? If not, have you tried alternative versions?
2. Are the axes, lines, bars and points labeled? Are the scales correct?
3. Does each figure have a legend, not a title?
4. Are the figures numbered and do they appear in the text in that order?
5. Does the text complement the information in the figures?

SUMMARY

Simple Tips & Tricks

“

Using Tables and Figures in Your Manuscript

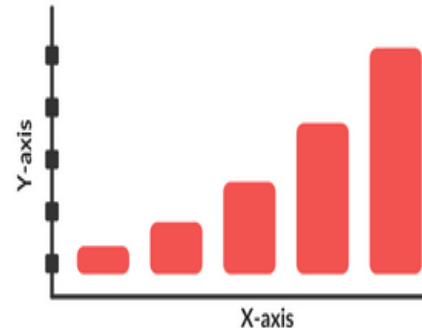
”



Table 1. XYZ

A (kg)	B (m)	C (s)

- A clear, descriptive, and concise title placed above the table.
- A good set of column titles (with units/unit symbols wherever applicable) that allow the reader to grasp the context of the table.
- Data should read from top to bottom.



- A clear, descriptive, and concise caption placed below the figure.
- A high-quality image with good resolution and appropriate size.
- Can include bar graphs, histograms, maps, scatter plots, etc.

Wish to learn more about writing scientific names in your manuscript? Visit enago.com/academy now!



@Enago



enagoacademy



enago.com/academy



enago.com/app

Points to remember

- Each journal has its own style guidelines, so always consult the publisher's Guide for Authors, also for the References list and citations format, and for the requested set-up, resolution, etc. for illustrations.

Points to remember

- Remember that the visual tools of your paper are the first visible and the most efficient way to present your results.
- How do you decide between illustrating your data with Figures or Tables? Generally, Tables give the actual experimental results, while Figures are often used for comparisons of experimental results with those of previous works, or with calculated/theoretical values.
- No illustrations should duplicate the information described elsewhere in the manuscript and remember that the legends have to be self-explanatory.

Points to remember

- Relate the tables and figures to the text. The point illustrated in the table or figure must be the point stated in the text.
- Use the fewest tables and figures needed to tell the story.
- Do not present the same data in both a figure and a table.

Acknowledgments

- For didactic material & examples:
 - Warren S. Browner MD, *Publishing and Presenting Clinical Research*, 1999
 - George Rutherford MD, UCSF
 - Mimi Zeiger, UCSF

More homework

- **Draft (revise):**
 - 3 to 4 tables
 - 1 figure (if any)
 - New analyses?
 - Revise other sections, as needed

